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Environmental Protection Department
Waste Certification Program

Sampling and Analysis Plan for Legacy Firing Table Gravel from Site 300

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1. PROJECT DESCRIPTION

1.1 Waste Description

This sampling and analysis plan is specific to legacy waste contaminated gravel originating from explosives testing facilities at the Lawrence Livermore National Laboratory (LLNL), Site 300. The gravel is primarily contaminated with depleted uranium, but it may also be contaminated with thorium or tritium. Contaminants will be identified through process knowledge and by sampling and analysis to demonstrate compliance with *Nevada Test Site Defense Waste Acceptance Criteria, Certification, and Transfer Requirements*, NVO-325 (Rev. 1). This plan applies only to the gravel waste stream BCLA-S30000004. Details of this waste stream are discussed in the *Application to Ship Low-Level Radioactive Waste to the Nevada Test Site* (1) and in Site 300 Procedure EX-404, *B Division/Site 300 Procedure for Handling and Packaging Low-Level Radioactive Waste* (2).

The testing arrangement is diagrammed in Figure 1. Pea gravel is placed in a pit to a depth of approximately 10 ft underneath the device to be detonated. The purpose of the gravel is to cushion the bunker from the shock wave of the explosion. Usually several shots are carried out with each filling of gravel. Certain experiments use devices that contain potentially hazardous materials, usually as metallic solids or alloys. Upon detonation, these materials are usually scattered in solid metal or alloy form over a wide area. A small fraction of this material is thought to be finely divided particulates. When post-shot health and safety screening measurements indicate that the levels of hazardous and radioactive materials have risen above certain specified levels or that the gravel has become compacted, the gravel is removed and replaced with new material. Site 300 maintains a Shot Material Database, which defines the quantity of potentially hazardous and radioactive constituents for each experiment detonated.

This is a legacy waste stream consisting of 73 containers (nominally 4 x 4 x 7 ft) of gravel. This gravel was originally removed from the firing tables between November 1988 and August 1989 and placed in a single pile. From August - December 1989, this pile was containerized into 44 containers, which would have provided effective randomization of the pile. Some historical sampling and analysis has been done on this waste stream, but it does not meet the requirements of NVO-325 (Rev. 1) and therefore can only be used to provide background information and justification for the details of this plan and not to qualify the waste for shipment to the Nevada Test Site (NTS). The remaining 29 containers were collected directly between January and September 1990. This was the period between the time when gravel was collected into one pile and the establishment of the current gravel handling procedure. (When the gravel was containerized, two 25-lb bags of diatomaceous earth were placed in the bottom of the container as a moisture

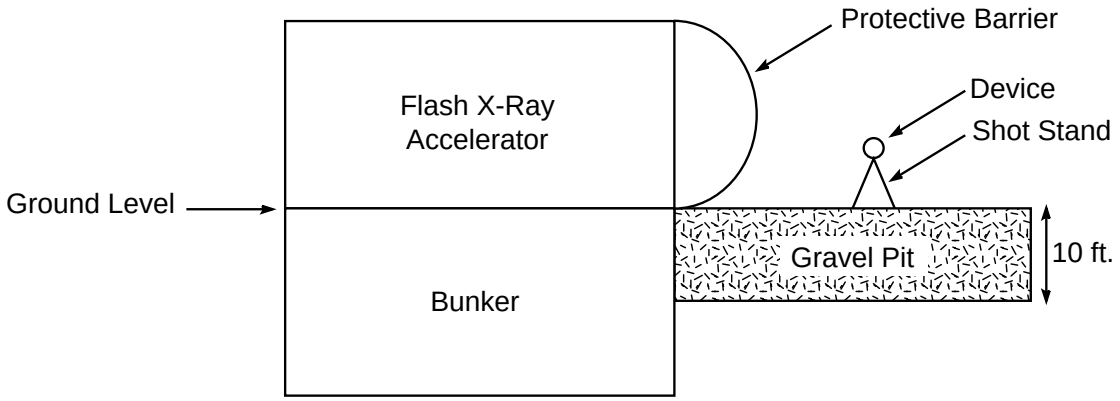

Figure 1. Typical Firing Table Arrangement at Site 300

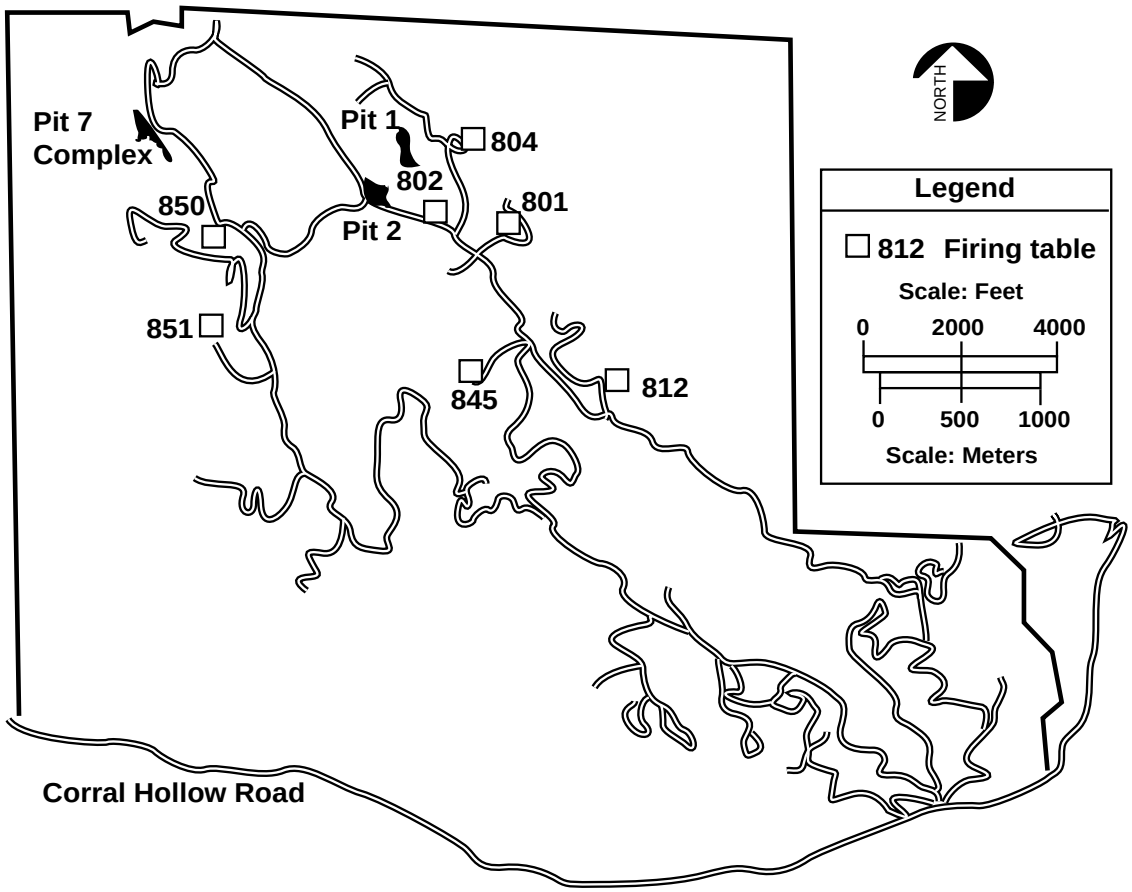

Figure 2. Location of Firing Tables at Site 300

absorbent, but this material is not expected to interfere with the sampling or analysis.)

The sampling will be the responsibility of Site 300 personnel, and the analysis will be the responsibility of the Environmental Analytical Sciences (EAS) laboratory. The analysis will be performed by Quanterra Environmental Services, 13715 Rider Trail North, Earth City, MO 63045. (Currently, EAS is not qualified under NVO-325 (Rev. 1). The intent is that EAS could take over the analysis if it qualifies in the future.) This project should be complete by March 1995.

1.2 Site Background

Site 300 at LLNL is located in the eastern Altamont Hills about 15 miles southeast of Livermore. One of the missions of Site 300 is diagnostic and materials testing of explosive compounds and devices. The two major types of testing are hydrodynamics experiments and advanced conventional weapons testing. Tests in which explosive compounds are detonated are performed on firing tables constructed adjacent to specifically designed control and equipment bunkers. Active firing tables are adjacent to Buildings 801 and 812 in the East Firing Area and Buildings 850 and 851 in the West Firing Area (Figure 2). The majority of firing table activities (in excess of 90%) are carried out at Buildings 801 and 851. The next most frequently used firing table area is at Building 850, and the Building 812 area is used only rarely. The same operations take place at 850 and 812 as take place at 801 and 851.

"B" Division/Site 300 is administered by the Associate Director for Nuclear Design through the Site 300 Resident Manager and the "B" Division Leader. Additional details for responsibilities and authorities for this facility may be found in *Site 300 Safety and Operational Manual* (3).

2. PROJECT ORGANIZATION AND RESPONSIBILITIES

Several groups will be involved in the performance and review of this project. The Department of Energy, Nevada Operations Office (DOE/NV) will review and approve this plan as part of LLNL's Application to ship the waste. The "B" Division staff at Site 300 will be responsible for sampling the waste according to the procedures of this plan. The Environmental Analytical Sciences (EAS) laboratory will be responsible for tracking and analyzing all samples used in characterization. The Environmental Protection Department's Hazardous Waste Management Division is responsible for packaging and transporting the gravel to the NTS. The Waste Certification Program validates data generated from sampling operations and is responsible for ensuring that all the criteria described in NVO-325 (Rev. 1) are met prior to certifying the waste for final disposal. Functional relationships for EAS and the relation of EAS to the Environmental Protection Department and the Waste Certification Program are shown in Ref. 4.

Functional project titles and responsibilities are:

The **EAS Laboratory Manager** (Patrick Epperson) assures that the analytical operation complies with federal and state regulations and LLNL policies.

The **EAS Supervisor** (Dave Silberman) reviews the records, data, and analytical results to assure that the analyses have been carried out according to applicable EAS procedures.

The **EAS QA/QC Manager** (Tony BeLue) audits EAS operations to assure that work performed in the EAS laboratory conforms to EAS Procedures.

The **"B" Division/Site 300 Representative** (Kent Haslam) assures that:

- The personnel who are authorized to perform this sampling operation are identified by memo/file.
- The work is performed by trained and authorized individuals.
- The requirements of all applicable procedures are followed by those individuals engaged in sampling.
- Health and Safety guidance by initial evaluation of scheduled tasks is given.

The **Bunker Supervisors and Personnel** assigned to sampling operations are responsible for adhering to the requirements of LLNL, EAS, and Site 300 procedures.

The **HWM Representative** (Rob Tageson) transfers the samples from the custody of the Bunker Supervisor to the custody of the EAS laboratory.

The **Waste Certification Engineer** (Blanca Haendler) reviews and validates all analytical data from sampling operations.

The **Waste Certification Program Manager** (Robert Fischer) certifies that all applicable requirements for waste shipment are met.

A flowchart showing the sampling and analysis process and the persons and groups responsible for each step is shown in Figure 3.

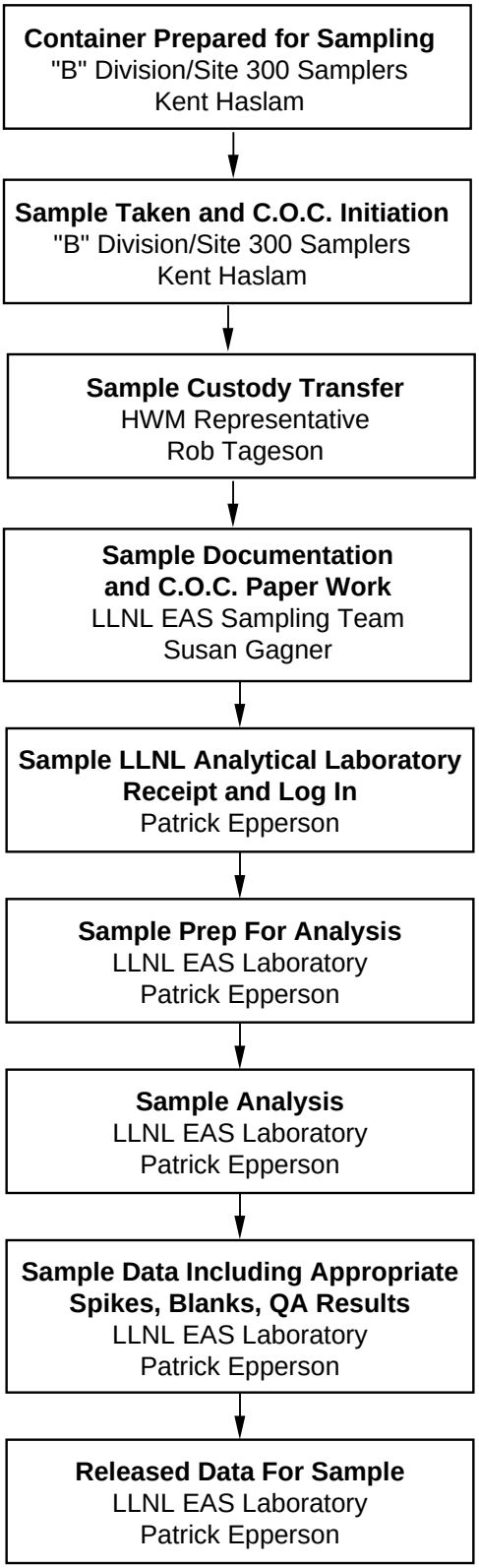

Figure 3. Responsibilities for Sampling and Analysis Process

3. COMPLIANCE WITH NEVADA TEST SITE WASTE ACCEPTANCE CRITERIA

The criteria set forth in *Nevada Test Site Defense Waste Acceptance Criteria, Certification, and Transfer Requirements*, NVO-325 (Rev. 1) which are relevant to this sampling and analysis plan are discussed in this section.

3.1 Transuranics

Not applicable: based on the known history of the Site 300 firing facilities, specifically the fact that no transuranic radionuclides are used there. The only expected radionuclides to be found are depleted uranium, thorium, and tritium.

3.2 Hazardous Materials

Low-level waste (LLW) to be disposed of at NTS cannot exhibit characteristics of or be listed as a hazardous waste as identified in Title 40, Code of Federal Regulations (CFR), Part 261 (RCRA) or under Title 22, California Code of Regulations (CCR). Therefore, analytical data must be provided to assure that no hazardous characteristics under these regulations are present within the waste prior to disposal at NTS. In order to ensure that this criterion is met, the samples will undergo the Waste Extraction Test (WET) procedure (sometimes referred to as the Soluble Threshold Limit Concentration [STLC] procedure) described in Appendix II of Section 66261 of Title 22. If the concentration of an extracted bioaccumulative or persistent toxic substance equals or exceeds that given as the STLC value pursuant to Title 22, the waste is hazardous. For inorganics, the WET (STLC) procedure has been chosen by LLNL for its Sampling and Analysis Plans over the Toxicity Characteristic Leaching Procedure (TCLP) referred to in NVO-325 (Rev. 1) because it will give additional metal constituents and is a more rigorous test. Comparison data for these two procedures may be found in Ref. 5, which also contains a list of inorganic and organic persistent and bioaccumulative toxic substances and their STLC and Total Threshold Limit Concentration (TTLC) values.

Based on the specific knowledge of hazardous constituents contained in the Shot Material Database, the inorganic constituents of primary concern are beryllium, copper, and lead. However, in order to ensure that no hazardous constituents are present in the waste above the applicable regulatory limits, the full suite of inorganics analyses, with the exception of mercury, will be performed by the WET procedure.

Based on the knowledge of the materials used in the test activities, organics are not expected to be found in the gravel, so organics analysis is not required.

3.3 Free Liquids

LLW to be disposed of at NTS cannot contain any free liquids. Minor liquid residue that does not exceed 0.5% by volume of the external container is

acceptable. To confirm compliance with this criterion, the samples showing visual evidence of free liquids will undergo Environmental Protection Agency (EPA) Test Method 9095, Paint Filter Liquid Test.

3.4 Particulates

NVO-325 (Rev. 1) requires demonstration that the waste consists of no more than 1% by weight of particles less than 10 μm in diameter or 15% by weight of particles less than 200 μm in diameter. This waste contains particulates. However, the metal containers in which it is packaged meet the requirements of NVO-325 (Rev. 1).

3.5 Gases

Radioactive gases and compressed gases (e.g., aerosol cans) as defined by 49 CFR 173.300 need to be stabilized or absorbed so that the pressure in the waste container does not exceed 1.5 atmospheres at 20°C. These gases are not present in this waste stream. Based on this information, analysis to demonstrate compliance with this criterion is not required.

3.6 Stabilization

NVO-325 (Rev. 1) requires that waste be treated to reduce volume and provide a more physically and chemically stable waste form. The gravel in this waste stream is stable. Analysis to demonstrate compliance with this criterion is not required.

3.7 Etiologic Agents

LLW containing etiologic agents as defined in 49 CFR 173.386 will not be accepted for disposal at NTS. Firing table gravel does not contain these agents, so no analysis is required to demonstrate compliance with this criterion.

3.8 Chelating Agents

LLW containing chelating agents at concentrations exceeding 1% by weight will not be accepted at NTS. The firing table gravel is not contaminated with chelating agents, so no analysis is required to demonstrate compliance with this criterion.

3.9 Polychlorinated Biphenyls (PCBs)

PCB-contaminated LLW will not be accepted for disposal at NTS unless the PCB concentration meets municipal solid waste disposal levels of 50 ppm or less. California regulates PCBs in concentrations greater than 5 ppm, and this more rigorous standard is maintained by NTS for waste coming from California. Based on the known history of the Site 300 firing facilities, PCBs are not present in the gravel, so analysis is not required to demonstrate compliance with this criterion.

3.10 Explosives and Pyrophorics

LLW containing explosives and or pyrophoric material in a form that may spontaneously explode or combust if the container is breached will not be accepted at NTS. Pyrophorics are not present in the firing table gravel, so analysis is not required to demonstrate compliance with this criterion. Explosives used in the experiments are completely spent, or they are visually identified and retrieved after the shot, and thus they are not present in the gravel in a form or quantity that may spontaneously explode or combust. Only technical staff who are well trained and experienced as explosives handlers are assigned to retrieve unexpended explosives from the firing table after an experiment. Because of that experience and attendant ability to recognize various explosives being tested, all material that is visually identifiable as explosives is removed from the waste stream. Therefore analysis is not required to demonstrate compliance with this criterion.

4. QUALITY ASSURANCE OBJECTIVES

The quality assurance objectives of this plan are identical to those described in the previously approved *Sampling and Analysis Plan for Contaminated Soil*, which is Appendix B of *Application to Ship Low-Level Radioactive Waste to the Nevada Test Site*. Specifically, the objectives are described in Section 4, subsections 4.1 Quality Assurance Objectives for Measurement; 4.2 Precision, Accuracy, Representivity, Comparability, Completeness (PARCC); 4.3 Audits; 4.4 Procedures; and 4.5 Sample Control. This section and its subsections are hereby incorporated by reference. For the complete citation, see Ref. 6.

5. SAMPLING

5.1 Sampling Objectives

The objective of the sampling effort is to verify generator knowledge of the firing table gravel waste stream (BCLA-S30000004) at LLNL, Site 300, in order to show compliance with NVO-325 (Rev. 1) and to provide legally defensible data for disposal of this waste to the NTS.

5.2 Sampling Frequency and Selection

A calculation has been done using Equation (8) of Ref. 7 to determine the number of containers that will be sampled. The historical data used for this calculation are shown in Appendix 2. The STLC data were used for the calculation because the STLC procedure is the method that will be used to certify the waste stream.

The results of the calculation are shown in Table 1. In every case, except that of copper, the equation gives a result of less than or equal to one container. For the sake of completeness, the calculation was also carried out for the TCLP data, and in every case, the result was less than one container.

Table 1. Number of Containers Required To Be Sampled of Each Metal

Metal	Number of Containers Required To Be Sampled
Antimony	<1
Arsenic	<1
Barium	<1
Beryllium	1
Cadmium	<1
Chromium	<1
Cobalt	<1
Copper	2
Lead	<1
Mercury	<1
Molybdenum	<1
Nickel	<1
Selenium	<1
Silver	<1
Thallium	<1
Vanadium	<1
Zinc	<1

A sample calculation, using the STLC data for copper, is given below.

Sample Calculation for Copper

Equation (8):

$$n = \frac{\left(t^2_{0.20}\right)\left(s^2\right)}{\Delta^2} \quad \text{, with } \Delta = RT - \bar{x}$$

n = appropriate number of containers to sample

$t^2_{0.20}$ = tabulated student's "t" value

s = standard deviation of sample

RT = regulatory threshold

$\overline{x}$ = average value of sample measurements from preliminary testing

For copper:

$t_{0.20} = 1.296$, $t^2_{0.20} = 1.680$

$\overline{x} = 6.82$

$RT = 25$

$s = 17.08$, $s^2 = 291.7$

$\Delta = 18.18$, $\Delta^2 = 330.5$

$$n = \frac{(1.680)(291.7)}{(330.5)} = 1.482 \text{ (round up = 2)}$$

Since the largest value of two containers is less than 10%, a 10% random selection sampling (seven containers) will be carried out. As in the *Sampling and Analysis Plan for Contaminated Soils,* six samples per container will be taken (8). Containers with amounts of hazardous materials greater than the applicable regulatory limits based on the historical sampling will be segregated from the population before the selection is made.

5.3 Sampling Strategy

Sampling shall be conducted with consideration to collecting representative samples, minimizing cross-contamination, and minimizing exposure to as-low-as-reasonably-achievable (ALARA) levels. Exposure and contamination control procedures will be established in conjunction with the appropriate facility's Environment, Safety, and Health Team in advance of sampling operations.

5.4 Sampling Methodology

Sampling of the firing table gravel will be done in accordance with Site 300 Procedure EX-404, Sampling, Section 1.3.5.3.2 (9). (This procedure is reproduced in Appendix 1.)

The procedure calls for returning the selected containers to a clean firing table. Each container will be inverted and dumped onto the firing table. Then the container will be reloaded using a small front-end loader. From the first 12 loads, a grab sample will be taken from alternate loads, for a total of six samples per container. After the sampling is completed, the remaining gravel, plus an additional 3 – 6 inches from the firing table, will be returned to the container. (An additional container will be used if necessary.)

All samples will be logged and tracked in accordance with EAS Procedure No. 202, "Sample Log In" (10), and EAS Procedure No. 201, "Sample Custody" (11). Because NVO-325 (Rev. 1) requires the use of chain-of-custody seals, the HWM Representative will ensure that those seals are used and will record this fact in the Comments Section of the Chain-of-Custody Form.

6. WASTE ANALYSIS SUMMARY

The waste analysis to be performed shall be conducted in accordance with NVO-325 (Rev. 1) and the methods referenced therein and in accordance with Ref. 7 as follows:

- Inorganics Analysis - The metals will be extracted by the WET procedure (CCR Title 22, Section 66261**,** Appendices I and II) and analyzed for soluble metals (STLC), with the exception of mercury.
- Free Liquids - On any samples showing visual evidence of free liquids, samples will be tested by using EPA Test Method 9095, Paint Filter Liquids Test.

7. DATA INTERPRETATION

The analysis of existing data has resulted in this basic sampling plan for the gravels in question. Assuming the confidence intervals (CI) as established by this existing data, a greater than 90% confidence level can be achieved in the following manner. If none of the resulting hazardous analyte concentrations equals or exceeds the regulatory threshold for that substance, the samples taken can be considered to be an adequate demonstration that the gravel in the containers as represented by these analytical data are non-hazardous and, therefore, radioactive waste. If one or more STLC concentrations equal or exceed the regulatory threshold, we are faced with the question of whether the contamination is: localized with respect to that particular container; localized with respect to all of the containers; or general, requiring analysis of each container.

Using the principle of simple random sampling, the following sampling criteria will be used:

1) Concentration(s) of RCRA-hazardous or CA-regulated analyte(s) equaling or exceeding its (their) respective regulatory threshold at up to

two of the six sample locations in a given container require(s) additional random sampling of the entire container. Equation (8) from SW846 will be used to determine the number of samples that will be required to characterize the container properly.

2) Concentration(s) of RCRA-hazardous or CA-regulated analyte(s) equaling or exceeding its (their) respective regulatory threshold at three or more of the six sample locations in a given container will cause the container to be segregated and not sent to NTS for disposal. This result will require an additional random sampling of seven containers to determine whether each and every container should be sampled.

8. REFERENCES

1. *Application to Ship Low-Level Radioactive Waste to the Nevada Test Site*, Addendum #2, pp. 2-43 – 2-57, Lawrence Livermore National Laboratory, UCRL-CR-111746 (rev. 1), (1993).

2. *B Division/Site 300 Procedure for Handling and Packaging Low-Level Radioactive Waste*, EX-404, pp. 1-2, Lawrence Livermore National Laboratory, latest revision.

3. *Site 300 Safety and Operational Manual*, "Safety and Management Program," Appendix D, pp. 9-10 and Fig. 1, Lawrence Livermore National Laboratory, latest revision.

4. *Application to Ship Low-Level Radioactive Waste to the Nevada Test Site*, Appendix B, *Sampling and Analysis Plan for Contaminated Soil*, pp. 8-10, Lawrence Livermore National Laboratory, UCRL-CR-111746 (rev. 1), (1993).

5. *Application to Ship Low-Level Radioactive Waste to the Nevada Test Site*, Appendix B, Sub-Appendix A-1, pp. 16-24 and G-2 - G-15, Lawrence Livermore National Laboratory, UCRL-CR-111746 (rev. 1), (1993).

6. *Application to Ship Low-Level Radioactive Waste to the Nevada Test Site*, Appendix B, Section 4, pp. 17-22, Lawrence Livermore National Laboratory, UCRL-CR-111746 (rev. 1), (1993).

7. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, (latest edition), U.S. Environmental Protection Agency.

8. *Application to Ship Low-Level Radioactive Waste to the Nevada Test Site*, Appendix B, *Sampling and Analysis Plan for Contaminated Soil*, p. 23, Lawrence Livermore National Laboratory, UCRL-CR-111746 (rev. 1), (1993).

9. *B Division/Site 300 Procedure for Handling and Packaging Low-Level Radioactive Waste*, EX-404, p. 13, Lawrence Livermore National Laboratory, latest revision.

10. EAS Procedure 202, "Sample Log In," *EAS Procedures Manual*, Lawrence Livermore National Laboratory, latest revision.

11. EAS Procedure 201, "Analytical Sample Custody," *EAS Procedures Manual*, Lawrence Livermore National Laboratory, latest revision.

APPENDIX 1

LEGACY GRAVEL SAMPLING PROCEDURE*

Containerized wastes consisting of gravel and small fragments (NTS Waste Stream Number BCLA-S30000004) shall be sampled using the following procedure:

- The container shall be moved to the vicinity of a clean firing table.
- The container will be inverted and dumped onto the firing table.
- Using the small front-end loader, the pile of gravel will be loaded back into the container. From the first 12 loads, a grab sample of approximately one cup will be taken from every other load, producing a total of six samples per container.
- The sample will be taken by scooping along the front face of the gravel load using a disposable paper or plastic cup.
- After sampling is complete, the remaining gravel will be returned to the container. An additional 3 – 6 inches of gravel will also be removed from the firing table and containerized.
- For each group of ten samples, one random field duplicate will be obtained by taking an additional grab sample from one of the loads. In addition, a sample of clean, unused gravel will be taken at the start of each sampling event. It will be closed and sealed immediately and used as a trip blank. Also, for every 20 samples, a sample of clean, unused gravel will be taken. It will be closed and sealed at the end of the sampling and used as a field blank.

*Reproduced from Ref. 9.

APPENDIX 2

HISTORICAL DATA FOR EQUATION (8) CALCULATION

INORGANICS ANALYSIS
SITE 300 LEGACY FIRING TABLE GRAVEL
STLC RESULTS

Element	Sb	As	Ba	Be	Cd	Cr	Co	Cu	Pb	Hg	Mo	Ni	Se
STLC Limits	**15**	**5.0**	**100**	**0.75**	**1.0**	**560**	**80**	**25**	**5.0**	**0.2**	**350**	**20**	**1.0**
Container No.													
94214 A	<0.06	0.03	6.1	0.02	<0.04	<0.05	0.11	0.20	<0.3	<0.001	<0.08	0.16	<0.02
94214 B	<0.06	0.02	4.3	0.02	<0.04	<0.05	0.10	0.15	<0.3	<0.001	<0.08	0.07	<0.02
94217	<0.06	0.03	5.9	<0.01	<0.04	<0.04	0.14	1.60	0.6	<0.001	<0.08	0.14	<0.02
94219	0.39	0.21	4.9	2.00	<0.04	0.13	0.08	120.	1.7	<0.001	<0.08	0.21	<0.02
94220	<0.06	0.04	5.7	2.20	<0.04	0.10	0.16	1.90	3.2	<0.001	<0.08	0.28	<0.02
94350	<0.06	0.03	4.6	0.32	<0.04	0.14	0.20	0.14	0.4	<0.001	<0.08	5.80	<0.02
94351	-	-	3.4	<0.01	-	-	-	0.28	<0.3	-	-	-	-
94352 A	<0.06	0.03	5.8	0.14	<0.04	<0.05	0.15	0.85	0.4	<0.001	<0.08	0.18	<0.02
94352 B	<0.06	0.02	7.8	0.11	<0.04	0.06	0.15	0.60	0.6	<0.001	<0.08	0.19	<0.02
94354 A	<0.06	0.02	3.3	0.02	<0.04	<0.05	0.10	0.19	<0.3	<0.001	<0.08	0.07	<0.02
94354 B	<0.06	<0.02	2.4	0.01	<0.04	<0.05	0.06	0.16	<0.3	<0.001	<0.08	0.06	<0.02
94391 A	0.08	0.03	7.3	<0.01	<0.04	<0.05	0.04	0.31	<0.3	<0.001	<0.08	0.03	<0.02
94391 B	<0.06	<0.02	2.1	<0.01	<0.04	<0.05	0.08	0.41	<0.3	<0.001	<0.08	0.14	<0.02
94391 B*	<0.06	<0.02	3.2	0.02	<0.04	<0.05	0.05	0.44	<0.3	<0.001	<0.08	0.05	<0.02
94392 A	<0.06	<0.02	3.2	0.08	<0.04	<0.05	0.09	0.27	<0.3	<0.001	<0.08	0.08	<0.02
94392 B	-	-	3.7	0.19	-	-	-	0.54	0.7	-	-	-	-
94393 A	<0.06	0.04	5.1	0.36	<0.04	<0.05	0.16	0.86	0.4	<0.001	<0.08	0.14	<0.02
94393 B	<0.06	<0.02	4.5	0.06	<0.04	<0.05	0.09	3.3	<0.3	<0.001	<0.08	0.13	<0.02
94394	<0.06	0.04	2.4	0.04	<0.04	<0.05	0.07	1.1	<0.3	<0.001	<0.08	0.04	<0.02
94395 A	<0.06	0.02	6.0	0.01	<0.04	<0.05	0.06	0.71	<0.3	<0.001	<0.08	0.03	<0.02
94395 B	<0.06	0.02	3.7	0.02	<0.04	<0.05	<0.04	0.33	<0.3	<0.001	<0.08	0.03	<0.02
94396 A	<0.06	0.04	3.2	0.09	<0.04	<0.05	0.05	1.1	<0.3	<0.001	<0.08	0.04	<0.02
94396 B	<0.06	0.03	1.9	<0.01	<0.04	<0.05	0.07	0.25	<0.3	<0.001	<0.08	0.06	<0.02
94397 A	<0.06	0.02	3.1	0.02	<0.04	<0.05	0.05	0.47	<0.3	<0.001	<0.08	0.06	<0.02
94397 B			3.4	0.03				1.8	<0.3				
94398 B			3.9	0.32				8.6	0.5				
94399 A			3.3	0.07				1.5	<0.3				
94399 B			3.8	0.06				0.81	<0.3				
94489 A			2.1	0.05				0.15	<0.3				
94496 A			5.6	0.23				1.6	0.6				
94496 B			5.5	0.08				0.43	<0.3				
94497 A			5.0	0.39				8.1	3.0				
94498			1.9	0.54				5.2	<0.3				
94499			4.4	0.09				0.33	0.5				
94500 A			4.5	0.15				3.0	0.3				
94500 B			2.8	0.06				0.35	2.0				
94501 A			4.5	0.30				5.9	0.6				
94501 B			5.7	0.24				13.	1.3				
94502			3.3	0.24				5.7	<0.3				
94503 A			3.6	0.09				0.38	<0.3				
94504 A			4.5	0.15				2.5	<0.3				
94504 B			2.4	0.12				1.9	<0.3				
94505			5.0	1.90				47.	1.2				
94513 A			3.9	0.15				15.	0.4				

***It is not currently known why two results are reported for the same sample. This is being investigated.**

Units are mg/L.
This was a non-SW846 analysis.

INORGANICS ANALYSIS
SITE 300 LEGACY FIRING TABLE GRAVEL
STLC RESULTS (CONT.)

Element	Sb	As	Ba	Be	Cd	Cr	Co	Cu	Pb	Hg	Mo	Ni	Se
STLC Limits	**15**	**5.0**	**100**	**0.75**	**1.0**	**560**	**80**	**25**	**5.0**	**0.2**	**350**	**20**	**1.0**
Container No.													
94513 B			3.6	0.34				42.	0.8				
94573			4.9	0.33				2.6	0.4				
94574			5.2	0.02				0.1	<0.3				
94576			3.9	0.69				6.1	0.6				
94677 A			3.1	0.04				0.22	<0.3				
94677 B			2.8	0.04				0.17	0.3				
94678			2.9	0.02				0.18	0.8				
94682 A			3.0	0.26				15.	0.3				
94682 B			4.1	0.41				9.7	0.6				
94682 C			6.4	0.64				33.	0.8				
94802			4.6	0.38				17.	0.4				
94804			3.8	0.14				13.	0.4				
94806			3.2	0.23				2.2	<0.3				
94809			3.2	0.51				1.8	<0.3				
95108 A			6.0	0.05				0.34	<0.3				
95108 B			2.8	0.02				0.14	<0.3				
95121 A			2.5	<0.01				0.13	<0.3				
95121 B			4.7	<0.01				0.79	<0.3				
95121 C			4.5	<0.01				0.58	<0.3				
95128 B			3.6	<0.01				0.46	<0.3				
95132 A			4.3	0.06				34.	<0.3				
95132 B			4.0	0.10				24.	<0.3				
95177 A			4.2	0.44				0.42	<0.3				
95177 B			3.0	0.27				0.46	<0.3				

Data Reviewed by:_____ Date:_____

Units are mg/L.
This was a non-SW846 analysis.

INORGANICS ANALYSIS
SITE 300 LEGACY FIRING TABLE GRAVEL
TTLC RESULTS

Element	Sb	As	Ba	Be	Cd	Cr	Co	Cu	Pb	Hg	Mo	Ni	Se
TTLC Limits	500	500	10,000	75	100	2,500	8,000	2,500	1,000	20	3,500	2,000	100
Container No.													
94351	<1	1.2	39	0.2	3.6	17	4.6	14	<6	0.02	<2	24	<0.4
94392 B	<1	1.2	57	1.7	3.6	16	6.8	14	<6	0.02	<2	18	<0.4
94397 B	2	1.8	96	4.1	4.2	27	7.2	290	14	0.04	<2	31	<0.4
94398 B	<1	7.4	88	11.0	3.9	24	6.6	220	<6	0.05	<2	25	<0.4
94399 A	2	1.8	200	3.4	6.3	38	13.0	330	17	0.05	<2	31	<0.4
94399 B	1	2.8	170	9.9	5.2	29	10.0	110	<6	0.05	<2	25	<0.4
94489 A	<1	1.2	99	3.2	3.1	21	5.2	39	37	0.04	<2	22	<0.4
94496 A	1	2.0	160	7.9	5.4	31	10.0	74	25	0.04	<2	28	<0.4
94496 B	<1	2.0	2	0.6	<0.8	<1	<0.6	14	<6	0.05	<2	<6	<0.4
94497 A	2	2.2	190	10.0	4.7	40	11.0	1800	78	0.06	<2	44	<0.4
94498	1	2.4	160	18.0	5.0	30	10.0	2500	26	0.02	<2	30	<0.4
94499	<1	2.6	98	4.0	3.4	24	5.6	140	22	0.04	<2	27	<0.4
94500 A	<1	1.6	120	6.8	3.8	26	7.2	1600	38	0.06	<2	26	<0.4
94500 B	<1	1.6	210	2.4	3.3	18	5.6	35	4	0.05	<2	28	<0.4
94501 A	<1	2.6	170	25.0	4.4	32	9.0	180	26	0.08	<2	29	<0.4
94501 B	<1	2.2	160	22.0	3.8	31	9.0	210	21	0.03	<2	30	<0.4
94502	4	1.8	190	140.0	5.6	38	14.0	1700	31	0.04	<2	40	<0.4
94503 A	<1	1.8	140	26.0	4.4	26	8.6	100	14	0.05	<2	32	<0.4
94504 A	1	1.2	98	9.3	4.2	26	6.9	3400	5	0.06	<2	28	<0.4
94504 B	2	2.2	100	22.0	3.3	24	7.3	200	17	0.05	<2	23	<0.4
94505	2	2.8	220	36.0	5.6	36	11.0	2000	320	0.03	<2	32	<0.4
94513 A	<1	2.7	220	18.0	5.0	37	11.0	1300	32	0.06	<2	40	<0.4
94513 B	<1	21.0	190	78.0	4.3	36	11.0	3100	38	0.04	<2	40	<0.4
94573	<1	1.5	140	26.0	5.5	29	11.0	82	17	0.03	<2	27	<0.4
94574	1	1.9	84	0.6	3.7	14	6.6	17	<6	0.03	<2	23	<0.4
94576	1	2.4	120	6.6	4.4	28	28.0	420	16	0.04	<2	78	<0.4
94677 A	<1	2.4	100	0.8	3.6	20	6.6	18	<6	0.03	<2	21	<0.4
94677 B	<1	1.4	91	2.8	4.3	31	6.8	62	8	0.04	<2	32	2.2
94678	<1	2.0	150	6.4	3.7	28	8.2	55	18	0.02	<2	38	<0.4
94682 A	<1	2.1	120	10.0	4.6	30	9.3	660	18	0.04	<2	26	<0.4
94682 B	<1	2.1	93	29.0	4.8	26	9.9	310	11	0.03	<2	26	<0.4
94682 C	<1	3.2	280	20.0	5.4	34	14.0	8300	21	0.02	<2	33	<0.4
94802	<1	1.1	100	17.0	3.3	18	6.6	230	6	0.02	<2	22	<0.4
94804	3	1.9	140	24.0	5.2	29	11.0	2000	25	0.02	<2	28	<0.4
94806	<1	1.4	150	480.0	4.8	31	33.0	190	26	0.02	4	71	<0.4
94809	<1	1.4	130	5.5	3.8	25	9.1	190	10	<0.01	<2	22	<0.4
95108 A	<1	1.6	90	0.3	2.1	14	4.5	16	<6	0.02	<2	17	<0.4
95108 B	<1	0.89	54	<0.2	3.2	21	5.4	14	<6	0.02	<2	25	<0.4
95121 A	<1	1.5	78	<0.2	3.0	23	8.3	24	<6	<0.01	<2	23	<0.4
95121 B	<1	1.8	98	<0.2	2.9	16	4.2	19	<6	0.03	<2	21	<0.4
95121 C	<1	1.8	74	<0.2	3.7	22	7.6	79	<6	0.05	<2	23	<0.4
95128 B	<1	0.96	120	<0.2	3.0	22	6.3	200	9	0.02	<2	24	<0.4
95132 A	13	4.0	150	13.0	6.0	27	8.8	1800	21	0.03	<2	30	<0.4
95132 B	9	2.9	160	8.0	3.4	25	7.2	1100	17	<0.01	<2	26	<0.4
95177 A	1	2.2	88	4.4	4.1	24	7.6	79	11	<0.01	<2	21	<0.4
95177 B	<1	<2	110	5.2	3.8	22	8.2	67	13	0.03	<2	22	<0.4

Units are mg/kg.
This was a non-SW846 analysis.

Data Reviewed by:_____ Date:_____

INORGANICS ANALYSIS
SITE 300 LEGACY FIRING TABLE GRAVEL
EP TOX* RESULTS

Element	As	Ba	Cd	Cr	Pb	Hg	Se	Ag
Action Level	**5.0**	**100**	**1.0**	**560**	**5.0**	**0.2**	**1.0**	**5**
Container								
94214 A	<0.02	0.41	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94214 B	<0.02	0.27	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94217	<0.02	0.28	<0.04	<0.05	<0.3	0.0004	<0.02	<0.02
94219	<0.02	0.48	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94220	<0.04	0.28	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94350	<0.02	0.27	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94351	<0.02	0.38	<0.04	<0.05	<0.3	0.0003	<0.02	<0.02
94352 A	<0.02	0.50	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94352 B	<0.02	0.54	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94354 A	<0.02	0.14	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94354 B	<0.02	0.13	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94391 A	<0.02	0.10	<0.04	<0.05	<0.3	0.0003	<0.02	<0.02
94391 B	<0.02	0.36	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94391 B+	<0.02	0.14	<0.04	<0.05	<0.3	0.0003	<0.02	<0.02
94392 A	<0.02	0.32	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94392 B	<0.02	0.37	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94393 A	<0.02	0.25	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94393 B	<0.02	0.31	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94394	<0.02	0.43	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94395 A	<0.02	0.57	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94395 B	<0.02	0.27	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94396 A	<0.02	0.27	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94396 B	<0.02	0.27	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94397 A	<0.02	0.46	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94397 B	<0.02	0.54	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94398 B	<0.02	0.57	<0.04	<0.05	<0.3	0.0003	<0.02	<0.02
94399 A	<0.02	0.34	<0.04	<0.05	<0.3	0.0003	<0.02	<0.02
94399 B	<0.02	0.28	<0.04	<0.05	<0.3	0.0004	<0.02	<0.02
94489 A	<0.02	0.89	<0.04	<0.05	<0.3	0.0003	<0.02	<0.02
94496 A	<0.02	0.36	<0.04	<0.05	<0.3	0.0003	<0.02	<0.02
94496 B	<0.02	0.20	<0.04	<0.05	<0.3	0.0003	<0.02	<0.02
94497 A	<0.02	0.48	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94498	<0.02	0.65	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94499	<0.02	0.70	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94500 A	<0.02	0.52	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94500 B	<0.02	0.63	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94501 A	<0.02	0.47	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94501 B	<0.02	0.46	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94502	<0.02	0.39	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94503 A	<0.02	0.39	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94504 A	<0.02	0.61	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94504 B	<0.02	0.52	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94505	<0.02	0.68	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94513 A	<0.02	0.71	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94513 B	<0.02	0.46	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94573	<0.02	0.55	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94574	<0.02	0.72	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94576	<0.02	0.69	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94677 A	<0.02	0.44	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94677 B	<0.02	0.46	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94678	<0.02	0.71	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94682 A	<0.02	0.21	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94682 B	<0.02	0.23	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94682 C	<0.02	0.49	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94802	<0.02	0.46	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94804	<0.02	0.44	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94806	<0.02	0.26	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
94809	<0.02	0.47	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
95108 A	<0.02	0.37	<0.04	0.16	<0.3	<0.0002	<0.02	<0.02
95108 B	<0.02	0.89	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
95121 A	<0.02	0.40	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
95121 B	<0.02	0.81	<0.04	<0.05	<0.3	0.0004	<0.02	<0.02
95121 C	<0.02	0.37	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
95128 B	<0.02	0.53	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
95132 A	<0.02	0.63	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
95132 B	<0.02	0.24	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
95177 A	<0.02	0.18	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02
95177 B	<0.02	0.22	<0.04	<0.05	<0.3	<0.0002	<0.02	<0.02

*** EP TOX was the predecessor to the TCLP analysis.**
+ It is not currently known why two results are reported for the same sample. This is being investigated.
Units are mg/L.

Data Reviewed by:_____ Date:_____

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